Amendments to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application.

Listing of Claims:

Claim 1 (original): Method of determining the velocity v and anellipticity η parameters for processing seismic traces in a common midpoint (CMP) gather including an anelliptic NMO correction, comprising:

- a preliminary step to define a plurality of nodes (dtn, τ_o), the said nodes being indicative of parameters dtn and τ_o representing the NMO correction for the maximum offset and the zero offset travel time in hyperbolic coordinates, the said preliminary step being followed by

- for each node (dtn, τ_o) defined in the preliminary step, the following steps:

- for static NMO correction of traces in the CMP gather as a function of the values of the said parameters dtn, τ_o at the node considered, and

- for calculating the semblance function associated with the said NMO correction for the node considered; and

- for each picked time t_o, a step including determination of the maximum semblance node (dtn (t_o), τ_o (t_o)),

- and a final step to convert the dtn (t_o) and τ_o (t_o) parameters so as to obtain the velocity V (t_o) and anellepticity η (t_o) laws.

Claim 2 (original): Method according to claim 1, wherein the nodes are defined during the preliminary step in an analysis volume (dtn, τ_o, t_o) determined by minimum and maximum values respectively [dtn_{min}, dtn_{max}] [τ_{omin}, τ_{omax}] and [t_{omin}, t_{omax}] of the dtn, τ_o and t_o parameters.

Claim 3 (original): Method according to claim 2, wherein, during the preliminary step, a corridor [dtn_{min} (t_o), dtn_{max} (t_o)], [τ_{omin} (t_o), τ_{omax} (t_o)] for changing dtn and τ_o parameters is delimited inside the analysis volume as a function of plausible velocity V and anellipticity η values, the nodes (dtn, τ_o) defined for applying the NMO correction being then located along the corridor thus delimited.

Claim 4 (currently amended): Method according to claim 1, ~~any one of the preceding claims,~~ further comprising, for each node (dtn, τ_o), a stacking step of the corrected seismic traces, following the semblance function calculation step.

Claim 5 (original): Method according to claim 4, wherein the stacking of corrected traces is done using only near offset traces.

Claim 6 (currently amended): Method according to claim 4, ~~any one of claims 4 or 5,~~ further comprising for each picked time, and following the step for determining the maximum semblance node, a step of checking that values dtn and τ_o of the maximum semblance node correspond to a stacking extreme value for the same values dtn and τ_o.

Claim 7 (currently amended): Method according to claim 1, ~~any one of the preceding claims,~~ further comprising a step of selecting and adjusting the pickings obtained, following the step implemented for determining the maximum semblance node (dtn (t_o), τ_o (t_o)) for each picked time t_o, before the conversion step.

Claim 8 (original): Method according to claim 7, wherein the said step of selecting and adjusting the pickings comprises a step of only retaining pickings dtn and τ_o for which time to the highest semblance pickings is greater than a predefined value.

Claim 9 (original): Method according to claim 8, wherein the said step of selecting and adjusting the pickings also comprises a step for adjusting the retained pickings dtn and τ_o by parabolic interpolations using values about the said picked values.

Claim 10 (original): Method according to claim 9, wherein the said step of selecting and adjusting pickings also comprises a step of eliminating retained and adjusted pickings dtn and τ_o when it is impossible to calculate the Dix interval velocities between the picking considered and higher semblance pickings.

Claim 11 (currently amended): Method according to claim 1, ~~any one of claims 1 to 10,~~ wherein the processing applied to seismic traces is an NMO correction process implementing a static correction $CORR_{NMO}$.

Claim 12 (original): Method according to claim 11, wherein, during the preliminary step, the NMO corrections $CORR_{NMO}$ are calculated for all nodes (dtn, τ_o) including in the analysis volume and all offsets of processed seismic traces.

Claim 13 (original): Method according to claim 12, wherein the NMO correction carried out for each node (dtn, τ_o), consists of applying NMO corrections $CORR_{NMO}$ calculated during the preliminary step.

Claim 14 (original): Method according to claim 11, ~~any one of claims 11 to 13,~~ wherein for a given (dtn, τ_o) pair, the static NMO correction $CORR_{NMO}$ of a seismic trace with offset x is carried out according to the following equation:

$CORR_{NMO}(x) = -\tau_o + \sqrt{\tau_0^2 + \frac{dtn(dtn+2\tau_0)}{x_{max}^2}x^2}$ in which X_{max} represents the maximum offset in the CMP gather.

Claim 15 (currently amended): Method according to claim 1, ~~any one of claims 1 to 10,~~ wherein the processing applied to seismic traces is a PSTM migration using a static NMO correction $CORR_{PSTM}$.

Claim 16 (original): Method according to claim 15, wherein, during the preliminary step, the NMO corrections $CORR_{PSTM}$ are calculated for all nodes (dtn and τ_o) included in the analysis volume and all migration offsets inside the migration aperture.

Claim 17 (original): Method according to claim 16, wherein the NMO correction step carried out for each node (dtn and τ_o) comprises, for each offset class, application of the said NMO corrections $CORR_{PSTM}$, calculated during the preliminary step on all midpoints inside the migration aperture.

Claim 18 (original): Method according to claim 17, wherein the NMO correction step carried out for each node (dtn and τ_o) comprises, for each offset class, the stack of the corrected midpoints following application of the said NMO corrections $CORR_{PSTM}$.

Claim 19 (currently amended): Method according to claim 15, ~~any one of claims 15 to 18,~~ wherein, for a given pair (dtn and τ_o), the static NMO correction $CORR_{PSTM}$ is carried out according to the following equation:

$$CORR_{PSTM}(x) = -\tau_o + \sqrt{\frac{\tau_0^2}{4} + \frac{dtn(dtn + 2\tau_0)(x - x + h)^2}{x_{max}^2}} + \sqrt{\frac{\tau_0^2}{4} + \frac{dtn(dtn + 2\tau_0)(x - x - h)^2}{x_{max}^2}}$$

where:

- x_m represents the coordinates of the midpoints,

- $x - x_m$ represents the migration aperture PSTM,

- h is the half source – receiver offset,

- xmax is the maximum offset and aperture of the migration.

Claim 15 (currently amended): Method according to claim 1, ~~any one of claims 1 to 10,~~ wherein the processing applied to seismic traces is a PSTM migration using a static NMO correction $CORR_{PSTM}$.

Claim 16 (original): Method according to claim 15, wherein, during the preliminary step, the NMO corrections $CORR_{PSTM}$ are calculated for all nodes (dtn and τ_o) included in the analysis volume and all migration offsets inside the migration aperture.

Claim 17 (original): Method according to claim 16, wherein the NMO correction step carried out for each node (dtn and τ_o) comprises, for each offset class, application of the said NMO corrections $CORR_{PSTM}$, calculated during the preliminary step on all midpoints inside the migration aperture.

Claim 18 (original): Method according to claim 17, wherein the NMO correction step carried out for each node (dtn and τ_o) comprises, for each offset class, the stack of the corrected midpoints following application of the said NMO corrections $CORR_{PSTM}$.

Claim 19 (currently amended): Method according to claim 15, ~~any one of claims 15 to 18,~~ wherein, for a given pair (dtn and τ_o), the static NMO correction $CORR_{PSTM}$ is carried out according to the following equation:

$$CORR_{PSTM}(x) = -\tau_o + \sqrt{\frac{\tau_0^2}{4} + \frac{dtn(dtn + 2\tau_0)(x - x + h)^2}{x_{max}^2}} + \sqrt{\frac{\tau_0^2}{4} + \frac{dtn(dtn + 2\tau_0)(x - x - h)^2}{x_{max}^2}}$$

where:

- x_m represents the coordinates of the midpoints,

- $x - x_m$ represents the migration aperture PSTM,

- h is the half source – receiver offset,

- xmax is the maximum offset and aperture of the migration.

Claim 20 (currently amended): Method according to claim 14, ~~any one of claims 14 or 19,~~ wherein, during the final conversion step, the parameters dtn (t_o) and (τ_o) are converted to the velocity law v (t_o) according to the following equation:

$$V = \frac{x_{max}}{\sqrt{dtn(dtn + 2\tau_0)\frac{t_0}{\tau_0}}}$$

Claim 21 (currently amended): Method according to claim 14, ~~claims 14 or 19,~~ wherein, during the final conversion step, the parameter τ_o (t_o) is converted to the anellepticity η (t_o) law according to $\eta = \frac{1}{8}\left(\frac{t_0}{\tau_0} - 1\right)$.

Claim 22 (currently amended): Method according to claim 20, ~~claims 20 and 21,~~ wherein parameter dtn is defined with respect to the velocity v and anellepticity η according to the following equation:

$$\mathrm{dtn} = \frac{8\eta}{1+8\eta} t_0 + \sqrt{\left(\frac{t_0}{1+8\eta}\right)^2 + \frac{x_{max}{}^2}{(1+8\eta)V^2}}$$

Claim 23 (original): Method according to claim 21, wherein parameter τ_o is defined according to anellepticity η according to the following equation:

$$\tau_0 = \frac{t_0}{1+8\eta}$$

Claim 24 (original): Method of characterizing a velocity field for processing seismic data using a gather of seismic traces at common midpoint, wherein, for each travel time t_o for a zero offset, a set of parameters dtn and τ_o is defined, representing the NMO correction for maximum offset, and the zero offset travel time respectively, in hyperbolic coordinates.

Claim 25 (new): Method according to claim 2, further comprising, for each node (dtn, τ_o), a stacking step of the corrected seismic traces, following the semblance function calculation step.

Claim 26 (new): Method according to claim 25, wherein the stacking of corrected traces is done using only near offset traces.

Claim 27 (new): Method according to claim 25, further comprising for each picked time, and following the step for determining the maximum semblance node, a step of checking that values dtn and τ_o of the maximum semblance node correspond to a stacking extreme value for the same values dtn and τ_o.

Claim 28 (new): Method according to claim 2, further comprising a step of selecting and adjusting the pickings obtained, following the step implemented for determining the maximum semblance node (dtn (t_o), τ_o (t_o)) for each picked time t_o, before the conversion step.

Claim 29 (new): Method according to claim 28, wherein the said step of selecting and adjusting the pickings comprises a step of only retaining pickings dtn and τ_o for which time to the highest semblance pickings is greater than a predefined value.

Claim 30 (new): Method according to claim 29, wherein the said step of selecting and adjusting the pickings also comprises a step for adjusting the retained pickings dtn and τ_o by parabolic interpolations using values about the said picked values.

Claim 31 (new): Method according to claim 30, wherein the said step of selecting and adjusting pickings also comprises a step of eliminating retained and adjusted pickings dtn and τ_o when it is impossible to calculate the Dix interval velocities between the picking considered and higher semblance pickings.

Claim 32 (new): Method according to claim 2, wherein the processing applied to seismic traces is an NMO correction process implementing a static correction $CORR_{NMO}$.

Claim 33 (new): Method according to claim 32, wherein, during the preliminary step, the NMO corrections $CORR_{NMO}$ are calculated for all nodes (dtn, τ_o) including in the analysis volume and all offsets of processed seismic traces.

Claim 34 (new): Method according to claim 32, wherein the NMO correction carried out for each node (dtn, τ_o), consists of applying NMO corrections $CORR_{NMO}$ calculated during the preliminary step.

Claim 35 (new): Method according to claim 32, wherein for a given (dtn, τ_o) pair, the static NMO correction $CORR_{NMO}$ of a seismic trace with offset x is carried out according to the following equation:

$CORR_{NMO}(x) = -\tau_o + \sqrt{\tau_0^2 + \frac{dtn(dtn + 2\tau_0)}{x_{max}^2} x^2}$ in which X_{max} represents the maximum offset in the CMP gather.

Claim 36 (new): Method according to claim 2, wherein the processing applied to seismic traces is a PSTM migration using a static NMO correction $CORR_{PSTM}$.

Claim 37 (new): Method according to claim 36, wherein, during the preliminary step, the NMO corrections $CORR_{PSTM}$ are calculated for all nodes (dtn and τ_o) included in the analysis volume and all migration offsets inside the migration aperture.

Claim 38 (new): Method according to claim 37, wherein the NMO correction step carried out for each node (dtn and τ_o) comprises, for each offset class, application of the said NMO corrections $CORR_{PSTM}$, calculated during the preliminary step on all midpoints inside the migration aperture.

Claim 39 (new): Method according to claim 38, wherein the NMO correction step carried out for each node (dtn and τ_o) comprises, for each offset class, the stack of the corrected midpoints following application of the said NMO corrections $CORR_{PSTM}$.

Claim 40 (new): Method according to claim 36, wherein, for a given pair (dtn and τ_o), the static NMO correction $CORR_{PSTM}$ is carried out according to the following equation:

$$CORR_{PSTM}(x) = -\tau_o + \sqrt{\frac{\tau_0^2}{4} + \frac{dtn(dtn+2\tau_0)(x-x+h)^2}{x_{max}^2}} + \sqrt{\frac{\tau_0^2}{4} + \frac{dtn(dtn+2\tau_0)(x-x-h)^2}{x_{max}^2}}$$

where:

- x_m represents the coordinates of the midpoints,

- $x - x_m$ represents the migration aperture PSTM,

- h is the half source – receiver offset,

- xmax is the maximum offset and aperture of the migration.

Claim 41 (new): Method according to claim 35, wherein, during the final conversion step, the parameters dtn (t_o) and (τ_o) are converted to the velocity law v (t_o) according to the following equation:

$$V = \frac{x_{max}}{\sqrt{dtn(dtn+2\tau_0)\frac{t_0}{\tau_0}}}$$

Claim 42 (new): Method according to claim 35, wherein, during the final conversion step, the parameter τ_o (t_o) is converted to the anellepticity η (t_o) law according to $\eta = \frac{1}{8}\left(\frac{t_0}{\tau_0} - 1\right)$

Claim 43 (new): Method according to claim 41, wherein parameter dtn is defined with respect to the velocity v and anellepticity η according to the following equation:

$$dtn = \frac{8\eta}{1+8\eta} t_0 + \sqrt{\left(\frac{t_0}{1+8\eta}\right)^2 + \frac{x_{max}^2}{(1+8\eta)V^2}}$$

Claim 44 (new): Method according to claim 42, wherein parameter τ_o is defined according to anellepticity η according to the following equation:

$$\tau_0 = \frac{t_0}{1+8\eta}$$

Claim 45 (new): Method according to claim 3, further comprising, for each node (dtn, τ_o), a stacking step of the corrected seismic traces, following the semblance function calculation step.

Claim 46 (new): Method according to claim 45, wherein the stacking of corrected traces is done using only near offset traces.

Claim 47 (new): Method according to claim 45, further comprising for each picked time, and following the step for determining the maximum semblance node, a step of checking that values dtn and τ_o of the maximum semblance node correspond to a stacking extreme value for the same values dtn and τ_o.

Claim 48 (new): Method according to claim 3, further comprising a step of selecting and adjusting the pickings obtained, following the step implemented for determining the maximum semblance node (dtn (t_o), τ_o (t_o)) for each picked time t_o, before the conversion step.

Claim 49 (new): Method according to claim 48, wherein the said step of selecting and adjusting the pickings comprises a step of only retaining pickings dtn and τ_o for which time to the highest semblance pickings is greater than a predefined value.

Claim 50 (new): Method according to claim 49, wherein the said step of selecting and adjusting the pickings also comprises a step for adjusting the retained pickings dtn and τ_o by parabolic interpolations using values about the said picked values.

Claim 51 (new): Method according to claim 50, wherein the said step of selecting and adjusting pickings also comprises a step of eliminating retained and adjusted pickings dtn and τ_o when it is impossible to calculate the Dix interval velocities between the picking considered and higher semblance pickings.